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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/780,946	02/18/2004	Jen-Chieh Shih	N1085-00201	2297

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DUANE MORRIS LLP
IP DEPARTMENT (TSMC)
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103-4196

EXAMINER

RAYMOND, BRITTANY L

ART UNIT	PAPER NUMBER
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1756

MAIL DATE	DELIVERY MODE
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08/01/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/780,946	Applicant(s) SHIH ET AL.	
	Examiner Brittany Raymond	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 17-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 17-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. Claims 1-8, 17-19 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richter (U.S. Patent Application 2002/0160318) in view of Lin (U.S. Patent 6929887).

Richter discloses a method for structuring a photoresist layer consisting of: providing a substrate (Paragraph 0015), placing a photoresist layer, which contains a photobase generator and a photoacid generator, on top of the substrate (Paragraph 0015), exposing the photoresist layer to a first wavelength in order to activate the photobase (Paragraph 0039), and exposing the photoresist layer to a second wavelength in order to activate the photoacid (Paragraph 0040), resulting in neutralization between the acid and the base (Paragraph 0055), as recited in claims 1

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and 18 of the present invention. As described above, the first photoresist dissolving agent generator is a photobase and the second is a photoacid, as recited in claim 3 of the present invention. It would have been obvious to one of ordinary skill in this art to have the photoacid as the first photoresist dissolving agent generator and the photobase as the second, as recited in claim 2 of the present invention, because both are embedded in the photoresist layer and each process produces the same final pattern. Richter states that to activate the photoacid generator, light having a wavelength between 150 and 300 nm is used (Paragraph 0030). Richter also states that to activate the photobase generator, light having a wavelength between 150 and 300 nm is used (Paragraph 0032). Since the ranges are the same, the first and second light sources could provide the same or different wavelengths during the two exposures, as recited in claims 4, 5 and 19 of the present invention. Richter also discloses that there is a post exposure bake step after the two exposures (Paragraph 0055), as recited in claims 6 and 23 of the present invention. Finally, Richter states that after the exposures, the photoresist is treated with a solution, in order to dissolve and remove unexposed photoresist, and the exposed parts remain behind to serve as a protective mask for a structuring step (Paragraph 0058), as recited in claims 7 and 8 of the present invention.

Richter fails to disclose that a packing and an unpacking mask are used during the two exposure steps.

Lin discloses a method for fabricating an integrated circuit device comprising: using a packed mask to form an image on a substrate, using an unpacked mask to

remove certain features from the packed mask pattern on the substrate, said unpacked images being aligned with the packed images (Column 4, Lines 34-58), as recited in claims 1 and 17 of the present invention.

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have used a packing and an unpacking mask for the two exposure steps of Richter, as suggested by Lin, because Lin teaches that packing and unpacking masks are used to improve the imaging of patterns when dense patterns are being formed so that the patterns have more accurate critical dimensions.

3. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being obvious over Richter (U.S. Patent Application 2002/0160318) in view of Lin (U.S. Patent 6929887) as applied to claims 1-8, 17-19 and 23 above, and further in view of DeSimone (U.S. Patent 6929904).

The teachings of Richter and Lin have been discussed in paragraph 2 above.

Richter and Lin fail to disclose that the photoresist dissolving agent generator of the second type is embedded in a water-soluble coating film, which is formed over the photoresist after using the packing mask.

DeSimone discloses a lithography process comprising: placing a polymer coating onto a substrate, imagewise exposing the coating to radiation to form exposed and unexposed coating portions, said exposed portions being water-soluble, and contacting said coating to a developing composition comprising carbon dioxide and water to form a pattern (Column 2, Lines 10-28), as recited in claims 20 and 22 of the present invention. DeSimone also discloses that the polymer coating can comprise a photoacid generator

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or a photobase generator (Column 2, Lines 41-44), as recited in claim 20 of the present invention.

Richter and Lin teach every limitation of dependent claim 21 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have embedded the second type of the photoresist dissolving agent generator in a water soluble film formed above the photoresist, as suggested by DeSimone, in the process of Richter because DeSimone teaches that water-soluble films can act as photoresists to produce a pattern. It also would have been obvious to have placed the water-soluble film above a photoresist layer because one of ordinary skill in the art would have known that bilayer photoresists are often used in photolithography processes.

Response to Arguments

4. Applicant's arguments, filed 5/22/2007, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art references.

Examiner has included the references, Lin and DeSimone to teach the use of a packing and unpacking mask in the two exposure steps of the present invention, and the use of a water-soluble film formed above the photoresist layer of the present invention. The use of a packing and an unpacking mask shows that two masks are being used during the exposure process.

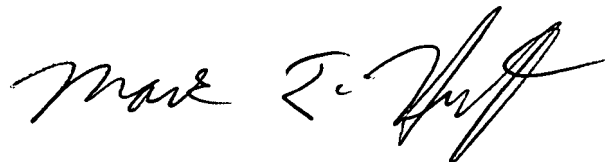
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brittany Raymond whose telephone number is 571-272-6545. The examiner can normally be reached on Monday through Friday, 8:00 a.m. - 4:30 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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